

REMARKS

Attached hereto are substitute Page 2 and Page 6 of the specification. The "C" for centigrade has been deleted. All other words remain unchanged.

Claims 1, 2, 5, 6, 11, 15, 23, 32, 35 and 43 have been rewritten in clean form. A marked-up version to show the changes made accompanies this paper with a cover sheet entitled "Version with Markings to Show Changes Made".

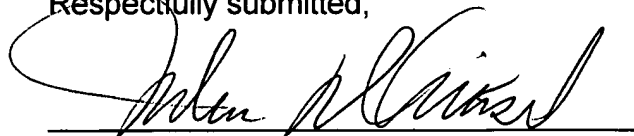
It is believed that the submission of this paper along with its attachments places the Amendment filed on March 13, 2001 and received by the Patent Office on March 19, 2001 (copy of return receipt post card enclosed) in compliant format.

For the foregoing reasons it is thought that the application is in condition for allowance. If the Examiner should find any reason for not allowing the application, he is respectfully requested to telephone the undersigned attorney. Any reasonably necessary amendments will be made promptly.

Reconsideration and allowance are requested.

Dated: 4/24/01

Respectfully submitted,



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IN THE  
**UNITED STATES PATENT & TRADEMARK OFFICE**

IN RE APPLICATION OF: CALLINAN et al.

CASE: 1423-9

SERIAL NO.: 09/428,508

FILED ON: October 27, 1999

FOR: RETAINING WALL SYSTEM

) Art Unit: 3673

) Examiner: F. Lagman

) COVER SHEET FOR  
) "VERSION WITH MARKINGS  
) TO SHOW CHANGES  
) MADE"IN ACCORDANCE  
) WITH 37 CFR 1.121

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behind the front wall.

It would be advantageous if at least preferred embodiments of the present invention provided a retaining wall and a method for forming the same that improves upon, or at least provides a useful alternative to, the retaining walls formed from tyres that exist in the prior art.

#### SUMMARY OF THE INVENTION

In a first aspect, the present invention provides a retaining wall for retaining an embankment or similar including a plurality of tyres arranged in a plurality of courses adjacent to the embankment and such that a central axis of each tyre is offset from vertical.

An advantage of such a construction is that a sloping embankment can be formed which then provides additional support to the retaining wall, and additional strength.

Typically, each tyre's central axis is offset from vertical at a batter angle ranging from  $10^{\circ}$  to  $20^{\circ}$ . Use of this angle has been observed in practice to provide ease of construction of the retaining wall whilst still retaining the advantages of the inclination of the wall.

Adjacent courses can be separated by a fill material, optionally by a distance that is half a tyre in diameter. Alternatively, adjacent courses can abut. Each tyre can at least partially (but typically completely) be filled with a fill material, and further fill material can be used to fill gaps between the tyres, and between the tyres and the embankment.

Typical fill materials include concrete (for example at the lowest course of tyres and at intermittent courses (eg. every alternating course) in the tyre wall construction). Granular or particulate, optionally free draining materials, can also be employed, for example, such as cobble, sand and/or shredded tyre. The use of shredded tyre further assists in the disposal of additional discarded tyres and is thus environmentally advantageous.

plurality of conveyor belt sections. Both the tread sections and side wall sections can be cut from additional tyres, and the conveyor sections can be cut from a single conveyor belt. The sections can then be joined together to  
5 define the reinforcing section.

Preferably the sections are joined to define a grid formation, which thereby replaces the existing geogrids used in the prior art. It should be appreciated that prior art geogrids are typically formed from woven and non-woven  
10 textiles, optionally reinforced with polymer; or from polymeric fibres. Such geogrids and reinforcing materials tend to be very expensive, whereas the use of tyres and conveyor belts is both environmentally and economically advantageous and, again, is a simpler option.

15 In the grid formation, individual sections can be attached or linked to and/or threaded through adjacent sections to define the grid formation.

Also, a reinforcing section can be provided for each course and is typically arranged to extend generally  
20 horizontally or to be inclined downwardly into the wall.

Each plurality of courses typically defines a "row". Accordingly, in an alternative construction, a plurality of rows of tyres can be arranged adjacent to the embankment.

In a fourth aspect, the present invention also  
25 provides a method for forming a retaining wall for retaining an embankment or similar including the steps of:

(a) forming a base for the retaining wall adjacent to the embankment and that slopes downwardly to the embankment from surrounding ground; and

30 (b) arranging a plurality of tyres in a plurality of courses adjacent to the embankment and along the base.

As above, the batter angle of the so-formed wall typically ranges from 10°[C] to 20°[C] offset from the vertical.

35 Typically, a course of tyres is laid and each tyre is then at least partially (preferably completely) in-filled

## CLAIMS:

1. A retaining wall for retaining an embankment or similar including a plurality of tyres arranged in a plurality of courses adjacent to the embankment and such that a central axis of each tyre is <sup>inclined</sup> ~~offset~~ from vertical.

2. A retaining wall as claimed in claim 1 wherein each tyre's central axis is offset from vertical at a batter angle ranging from 10° ~~C~~ to 20° ~~C~~.

3. A retaining wall as claimed in claim 1 or claim 2 wherein adjacent courses:

- are separated by a fill material, optionally by a distance that is half a tyre in diameter; or

- abut.

4. A retaining wall as claimed in any one of the preceding claims wherein each tyre is at least partially filled with a fill material, and further fill material fills gaps between the tyres, and between the tyres and the embankment.

5. A retaining wall as claimed in claim 4 wherein the fill material includes:

- concrete at the lowest course of tyres; ~~and~~ or

- a granular or particulate, optionally free draining material.

6. A retaining wall as claimed in claim 5 wherein the granular ~~or~~ particulate material is <sup>Selected from a group consisting of</sup> cobble, sand ~~and~~ or shredded tyre.

7. A retaining wall as claimed in any one of the preceding claims wherein at least some of the tyres are each cut:

(a) in a plane between opposing side walls thereof and are arranged in the wall so that both side walls generally face downwards; and ~~or~~

(b) to remove a substantial proportion of one of the side walls and are arranged in the wall so that the remaining uncut side wall generally faces downwards.

8. A retaining wall as claimed in claim 7 wherein in (a), a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout.

9. A retaining wall as claimed in claim 7 or claim 8 wherein in (b), the removed side wall is arranged in the tyre to be adjacent to the remaining side wall when the tyre is located in the wall.

10. A retaining wall as claimed in claim 9 wherein a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when arranged in the wall.

11. A retaining wall for retaining an embankment or similar that is formed from a plurality of tyres arranged in a plurality of courses adjacent to the embankment wherein at least some of the tyres are each cut:

(a) in a plane between opposing side walls thereof and such that a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout, and so that the tyres can be arranged in the wall such that both side walls generally face downwards; and or

(b) to remove a substantial proportion of one of the side walls wherein the removed side wall is arranged in the tyre to be adjacent to the remaining side wall, and the tyres are arranged in the wall so that the remaining uncut side wall generally faces downwards.

12. A retaining wall as claimed in claim 11 wherein in (b), a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when arranged in the wall.

13. A retaining wall as claimed in claim 11 or claim 12 wherein the cut tyres are substantially filled with fill material in the finished retaining wall.

14. A retaining wall as claimed in any one of claims 11 to 13 wherein the courses of the retaining wall are constructed in a manner as defined in any one of claims 1

to 6.

15. A retaining wall for retaining an embankment or similar including a reinforcing section extending rearwardly into the wall from an outer portion thereof, the reinforcing section being part of the retaining wall and  
5 being formed from:

(a) portions/sections cut from one or more tyres;  
[and/or

(b) conveyor belt portions/sections.

10 16. A retaining wall as claimed in claim 15 wherein the reinforcing section is attached to the outer portion of the wall.

15 17. A retaining wall as claimed in claim 15 or claim 16 wherein the reinforcing section is formed by joining together a plurality of tyre tread sections, a plurality of tyre side wall sections and/or a plurality of conveyor belt sections.

18. A retaining wall as claimed in claim 17 wherein the sections are joined to define a grid formation.

20 19. A retaining wall as claimed in claim 18 wherein individual sections are attached, linked, or threaded to/through adjacent sections to define the grid formation.

20. A retaining wall as claimed in any one of claims 15 to 19 wherein the reinforcing section is formed from a  
25 plurality of sections cut from mining conveyor belts.

21. A retaining wall as claimed in any one of claims 15 to 20 wherein the outer portion is formed from a plurality of elements arranged in a plurality of courses, and a reinforcing section is provided for each course and  
30 is arranged to extend generally horizontally or be downwardly inclined into the wall.

22. A retaining wall as claimed in any one of claims 15 to 21 wherein an outer face of the wall is defined by a plurality of tyres that are arranged in a plurality of  
35 courses adjacent to the embankment, wherein at least some of the tyres in the wall have an intact tread portion.

23. A retaining wall as claimed in any one of claims 15 to 22 <sup>claim 10</sup> wherein the outer portion is formed from a plurality of tyres in a manner as defined in any one of claims 1 to 14.

5 24. A retaining wall as claimed in any one of claims 1 to 14, or 21 or 23, wherein the plurality of courses define a row and wherein a plurality of rows are arranged adjacent to the embankment.

10 25. A method for forming a retaining wall for retaining an embankment or similar comprising the steps of:

(a) forming a base for the retaining wall adjacent to the embankment and that slopes downwardly to the embankment from surrounding ground; and

15 (b) arranging a plurality of tyres in a plurality of courses adjacent to the embankment and along the base.

26. A method as claimed in claim 25 wherein the base is formed to provide an offset in the wall from vertical at a batter angle of 10° to 20°.

20 27. A method as claimed in claim 26 wherein the central axis of each tyre in the wall is offset from vertical at an angle that is approximately equal to the batter angle.

28. A method as claimed in any one of claim 28 to 30, wherein each course of tyres is arranged to be offset along  
25 the line of the course from adjacent course(s).

29. A method as claimed in any one of claims 25 to 28 wherein in step (b) a course of tyres is laid and each tyre is at least partially in-filled with a fill material prior to laying the next course.

30 30. A method as claimed in claim 29 wherein each tyre in a course is filled such that:

- tyre(s) in the next course abut that tyre; or
- tyre(s) in the next course are separated by the fill material from that tyre.

35 31. A method as claimed in claim 29 or claim 30 wherein during filling of each course, additional fill



material is provided to fill gaps between tyres, and between the tyres and the embankment.

32. A method as claimed in any one of claims 25 to 31 wherein, prior to laying a course, at least some of the  
5 tyres in the course are each cut;

(i) in a plane between opposing side walls thereof and are arranged in the walls so that both side walls generally face downwards; and or

(ii) to remove a substantial proportion of one of the  
10 side walls, and are arranged in the walls so that the remaining uncut side wall generally faces downwards.

33. A method as claimed in claim 32 wherein in (i), a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout.

15 34. A method as claimed in claim 32 or claim 33 wherein in (ii) the removed side wall is arranged in the tyre to be adjacent to the remaining side wall when the tyre is located in the wall.

20 35. A method as claimed in claim 34 wherein a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when the tyre is arranged in the wall.

25 36. A method for forming a retaining wall from a plurality of tyres comprising the step of cutting at least some of the tyres:

(a) in a plane between opposing side walls thereof, wherein a section of the tyre remains uncut to provide a hinge for pivoting of the tyre portions thereabout, and then arranging those tyres in the walls so that both side  
30 walls generally face downwards; and or

(b) to remove a substantial portion of one of the side walls, with the removed side wall being arranged in the tyre to be adjacent to the remaining side wall, and then arranging those tyres in the wall so that the  
35 remaining uncut side wall generally faces downwards.

37. A method as claimed in claim 36 wherein in (b), a liner is positioned between the removed and remaining side walls to cover the lower opening of the tyre when it is arranged in the wall.

5 38. A method as claimed in claim 36 or claim 37 wherein the cut tyres are substantially filled with a fill material in the finished retaining wall.

39. A method as claimed in any one of claims 36 to 38 wherein the courses are constructed in accordance with the  
10 method as defined in any one of claims 25 to 31.

40. A method for forming a retaining wall for retaining an embankment or similar including the step of positioning in the wall a reinforcing section that is formed from portions/sections cut from one or more tyres or  
15 from one or more conveyor belts.

41. A method as claimed in claim 40 wherein an outer face of the wall is defined by arranging a plurality of elements in a plurality of courses adjacent to the embankment to define the face.

20 42. A method as claimed in claim 41 wherein, prior to or after the arranging of each course, a reinforcing section is attached to that course.

43. A method as claimed in claim 42 wherein, prior to attaching the reinforcing section to each course, the  
25 reinforcing section is pre-formed into a grid structure by joining together a plurality of tyre tread sections, a plurality of tyre side wall sections and or a plurality of conveyor belt sections.

44. A method as claimed in any one of claims 41 to 43  
30 wherein the elements are tyres.

45. A method as claimed in claim 44 wherein at least some of the tyres have an intact tread portion.

46. A method as claimed in any one of claims 41 to 45 wherein the face of the wall is formed using a method as  
35 defined in any one of claims 25 to 39.